C1 section 2.4

Completing the Square

5 expand $(x+3)^2$

	x	$+3$
x	x^2	$3x$
$+3$	$3x$	9

$$= x^2 + 6x + 9$$

M1 so $x^2 + 6x + 9$ factorises into the perfect square

$(x+3)^2$

Factorise these perfect squares

a $x^2 + 8x + 16 = (x+4)^2$

b $x^2 + 10x + 25 = (x+5)^2$

c $x^2 + 14x + 49 = (x+7)^2$

d $x^2 + 16x + 64 = (x+8)^2$

M2 Explain why $x^2 + 22x + 100$ is <u>not</u> able to be factorised into a perfect square.

The $22 \Rightarrow (x+11)^2$ the $100 \Rightarrow (x+10)^2$ (not equal)

M3 How could we change $x^2 + 22x + 100$ so that it <u>could</u> be written as a perfect square

idea 1 : $x^2 + 22x + \underline{121}$

idea 2 : $x^2 + \underline{20x} + 100$

M4 Turning

$$x^2 + 22x + 100$$

into $x^2 + 22x + 121$

by adding 21 is said to be completing the square

We could write

$$x^2 + 22x + 100 + 21 = (x+11)^2$$

Notice how this looks in the grid

	x	$+11$
x	x^2	$11x$
$+11$	$11x$	100 $+21$

(M5) Since

$$x^2 + 22x + 100 + 21 = (x+11)^2$$

We also know

$$x^2 + 22x + 100 = (x+11)^2 - 21$$

This is writing $x^2 + 22x + 100$ in completed square form

M6 Write $x^2 - 6x + 9$ as a perfect square

$$x^2 - 6x + 9 = (x - 3)^2$$

Use this to write

$x^2 - 6x + 4$ in completed square form

$$(x - 3)^2 - 5$$

M7 Ex 2C

1 $x^2 + 4x = (x+2)^2 - 4$

2 $x^2 - 6x$

3 $x^2 - 16x = (x-8)^2 - 64$

4 $x^2 + x = \left(x+\frac{1}{2}\right)^2 - \frac{1}{4}$

5

6 $2x^2 + 16x = 2[x^2 + 8x] = 2[(x+4)^2 - 16]$

M8 Ex2D

1 $x^2 + 6x + 1 = 0$

$(x+3)^2 - 8 = 0$

$(x+3)^2 = 8$

$x + 3 = \pm\sqrt{8}$

$x = -3 \pm \sqrt{8}$

$x = -3 \pm 2\sqrt{2}$